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Vol. 125 OCTOBER 1953 No. 10

CONTENTS

Editorial

The Sale of Home Remedies 322

Articles

Basic Philosophies of Pharmaceutical Service and Relationships: From an Educator's Point of View. By D. C. Brodie 324

In Vivo Experiments with Carcinogens II, A Survey of the Period 1949-51. By J. R. Sampey..... 329

Some Important Points in the History of Education and Legislation in a Century of American Pharmacy. By C. L. Huyck 340

Selected Abstracts 345

Book Reviews 353

EDITORIAL

THE SALE OF HOME REMEDIES

MORE and more pressure is being applied by manufacturers of home remedies to open new channels for the retail distribution of their products. Many of these remedies have been traditional drug store items since their inception. In many states they are defined as drugs and their sale restricted to licensed pharmacies. In several states the efforts to enforce this legal restriction have been challenged in the courts and with some success.

Those responsible for breaking down the restrictions against the promiscuous sale of such drugs have used as their arguments two important allegations. These are, first, that the label contains adequate directions for use and, second, that their sale in licensed pharmacies is not attended or accompanied by any more supervision than that given such a sale in a supermarket, a bar or a pool-hall. These arguments have had a telling effect in the courts, not so much that they are totally valid as because pharmacists themselves have encouraged public acceptance of these allegations.

Pharmacists, by and large, have placed far too much stock in restrictive legislation and not enough in the simple adherence to professional ideals and principles. In our smug way we have continued along over the past several years quite serene in the belief that since the state pharmacy act restricted the sale of drugs to drug stores nothing could possibly threaten this, our special privilege. We forgot that all such special privileges are granted by the public only when clearly in the public interest and not for the economic advantage of the group to whom they are given. Instead of using this special privilege in a manner that would continue to inspire public confidence in us, we drifted into a state of indifference which still pervades many in our ranks. Home remedies were either placed on self-service or sold by non-professional help with no guidance whatsoever and nothing which in the slightest might be construed as professional supervision. We have devoted our windows to drugs of the most questionable character and sold products with the greatest margin rather than those of the best quality.

How often does the pharmacist in selling home remedies try to discourage self-treatment when he suspects the customer is suffering

from some undiagnosed and possibly morbid disease? How often does he warn the customer of the possible ill-effects of many home remedies, even as simple a drug as aspirin? In his customer contacts is the customer's health and safety his primary concern or is profit? Finally, if we are truly professional men and women should not these standards be the rule rather than the exception?

There can be no rebuttal to the argument that only professionally trained personnel should sell drugs, be they home remedies or prescriptions. The fault lies in the way we have failed in doing it so as to lose public confidence and support. The courts in their rulings have simply reflected this changed public attitude.

Pharmacy has lost heavily in these recent battles and the economic impact is certain to be felt. We can recover our losses but not by making noises and condemning our legal adversaries. Neither can it be done by even more blatant merchandizing activities and an attempt to "out-super" the supermarket. When the pharmacist convinces each customer that his or her welfare is indeed his primary concern, the public again will turn to the pharmacist for guidance on health matters including home remedies. Then and then only can we be unconcerned over the availability of such drugs in non-drug outlets.

This battle will not be won overnight. It must be conducted by each pharmacist on his premises and in his contacts with the customer. It must be based on an honest belief in the principles involved and a return to our professional ideals. Those pharmacists who follow this course of action will have the reward of winning back the customers lost, as well as seeing their professional status grow in public esteem and respect.

L. F. Tice

BASIC PHILOSOPHIES OF PHARMACEUTICAL SERVICE AND RELATIONSHIPS: FROM AN EDUCATOR'S POINT OF VIEW *

By Donald C. Brodie **

I FEEL singularly honored this afternoon in being selected to participate in this panel discussion on the Basic Philosophies of Pharmaceutical Service and Relationships. Not too many years ago an educator would have been regarded as somewhat of a "fifth wheel on the wagon" on such a panel. However, during the past 25 years the efforts of hospital administrators, the American Hospital Association, the American Society of Hospital Pharmacists and the American Association of Colleges of Pharmacy have led to the development of pharmacy service in hospitals at an increasingly high level. Today as administrators, physicians, nurses, pharmacists and educators, we are cognizant of the stature that this specialized area of the age-old profession of pharmacy has attained. What the next 25 years will bring in terms of the advancement of hospital pharmacy service no one knows, but I feel confident that the decisions regarding some of our current problems, particularly those dealing with pharmaceutical education, will have a marked bearing on future progress. This afternoon I invite you to consider with me four areas of thought: (1) the basic philosophy; (2) pharmacy service; (3) education and the hospital pharmacy; (4) education: key to the future.

The Basic Philosophy

The care of the sick and injured has been the concern of mankind since time immemorial and there are many scholarly works to which we might turn for a statement of the basic philosophy underlying hospital practice. In 1946 Dr. Malcolm T. MacEacherin † stated clearly the functions of the hospital as follows:

> "There devolves upon the hospital, therefore, the duty of providing the requisites for the maintenance and restoration of health. This duty involves four functions: (1) care of the sick and injured; (2) education of physicians, nurses and other personnel; (3) public health—prevention of disease

* Presented at the Institute of Hospital Pharmacy, Los Angeles, June, 1953.

** The University of California College of Pharmacy, San Francisco 22, Calif.

† MacEacherin, Malcolm T., "Hospital Organization and Management", Physicians Record Co., 1946.

and promotion of health; and (4) advancement of research in scientific medicine."

Permit me to summarize Dr. MacEachern's statements in five words, namely, *care, education, public health, research.* The order in which these functions are listed following the "care of the sick and injured" is perhaps of little concern, but the position of the number one objective must remain unchanged. Therefore, the basic philosophy upon which hospital practice is based is the patient, his care and welfare. All services and all activities must be integrated toward that end in as an efficient and effective manner as possible in order that the net result may be an integrated program of a large number of services, all of which are directed toward the attainment of a common objective. The hospital pharmacy, although far removed from the patient in its physical location, provides a service that is reflected on the ward of every hospital, a service that is available at the bedside of every patient. Supplying medication is indeed an important aspect of pharmaceutical service in the hospital, but of even greater service to patient welfare are the integrity and competence of those who provide that service.

Pharmacy Service

The pharmacist's total service in a hospital evolves around the central concept that he, the pharmacist, is the expert on the chemistry, the formulation, the pharmacology and the toxicology of medicinal agents. When problems in each of these areas arise, the pharmacist, by virtue of his background and training, is the logical person to whom members of the hospital staff may turn for consultation. This portion of pharmacy service is characteristic particularly of pharmacy as practiced in the hospital. It is true that pharmacy service in general provides varying degrees of this direct physician-pharmacist relationship, but in the hospital the consultative service of the pharmacist is the rule rather than the exception. This is the portion of hospital pharmacy service that alone warrants specialized training for those who would become proficient in this area. In addition to providing expert consultative service, the pharmacist performs a number of other functions which round out the scope of hospital pharmacy service. He compounds and dispenses prescriptions and ward orders; disseminates factual information regarding drugs and chemicals; participates in activities of a therapeutics and formulary committee; procures drugs and health supplies through sources that provide maximal

economic benefits to the institution and at the same time assures maximal protection to the patient; protects patient and institutional welfare by complying with laws of the state and nation governing the distribution of drugs, narcotics and poisons. The pharmacist is the only person in the health science team whose education and background provide the qualifications necessary for performance of the total service alluded to above. The practice of attempting to provide pharmacy service in a hospital by nonpharmacist personnel is not only an unethical professional practice, but it is also dangerous in terms of patient care and welfare. Furthermore, it is all too often an expensive practice in terms of hospital economy.

Education and the Hospital Pharmacy

As we turn now to education and the hospital pharmacy, we must not lose sight of our main objective, namely, patient care and welfare. It appears perfectly obvious that the pharmacist's basic professional education, his specialized post-graduate education, and his continuing day by day education should enable him to provide a type of pharmacy service that is constantly improving, one that will be manifest in terms of betterment in the over-all picture of patient care. Permit me to elaborate on one phase of this broad subject, namely, the hospital pharmacy and its educational potential. The hospital should provide educational opportunities for the betterment of all specialized groups practicing within the institution. Post-graduate education in pharmacy is not supported by either a precedent or by tradition. Members of the other health professions have established strong post-graduate traditions that offer resources to the average practitioner for his continued improvement. The pharmacy profession is allerted to this serious void in its educational program and many colleges of pharmacy are today making substantial contributions by offering post-graduate professional instruction. I want to congratulate the American Hospital Association for its support in sponsoring the annual Institute in Hospital Pharmacy. This program has done much to make hospital pharmacists what I believe to be the most educationally-minded group of practicing pharmacists in America today. I encourage all of you in this type of endeavor. As an educator, I want to suggest that you consider ways of implementing these annual programs in your own institutions. Staff conferences, seminars with guest speakers, journal clubs and appropriate research projects provide excellent opportunities for on-the-job educational

betterment. What about the library facilities in your own institutions? I am sure that there is an abundance of clinical literature available, but what about current periodicals and books in the areas of pharmacy, pharmaceutical chemistry and pharmacology? Have you made an honest effort to improve your institutional library in your own professional area?

Internships in hospital pharmacy are being offered by a number of institutions in our country to qualified graduates of colleges of pharmacy and I suspect that more hospitals will be providing pharmacy internship programs in the future. I visualize the ideal situation to exist where a hospital can work conjointly with a college of pharmacy in establishing and executing the internship program. This makes it possible to establish a meaningful academic program at the graduate professional level and to integrate it with an experience program in the hospital pharmacy. The Committee on Minimum Standards of the American Society of Hospital Pharmacists has proposed a classification of "academic" and "nonacademic" internships. I am entirely sympathetic with the internship movement, but I am opposed to the above classification because, to me, it is professionally and educationally unsound. I believe that all internships must have an academic component. To you administrators who may be present today, I caution you of the dangers that appear to exist in the so-called nonacademic internship. The latter carries the connotation of training without education and of this the profession of pharmacy has too conspicuous a tradition. If internships are to be established in hospitals which are not associated with a college of pharmacy, may I ask you to consider two criteria in determining whether your institution should undertake such a program on its own resources: (1) the educational background and perspective of your chief pharmacist, (2) the educational facilities and practices that now exist in your institution, particularly as they relate to the pharmacy.

The hospital pharmacy possesses an educational potential that if developed in accord with sound educational practices will lead to (1) better qualified individual practitioners, (2) more effective pharmacy service, (3) improved patient care and welfare.

Education: Key to the Future

Pharmaceutical education is in the middle of an active growth period. In 1925 the basic program in pharmaceutical education in this country was three years, and in 1932 it became four years. Edu-

cational requirements in pharmacy are still being adjusted upward, but in a very slow and uncertain manner. The Pharmaceutical Survey of 1948 pointed to the need for two years of preprofessional and four years of professional education. I believe that this should be the standard educational program for the profession of pharmacy. This permits time for a reasonable program in general education following which the professional program can be developed at a satisfactory level. This program also permits time for specialization in the fourth professional year. In the case of hospital pharmacy, it provides opportunity to develop an academic background upon which a meaningful internship can be built.

Educators the world over are concerned with the educational deficiencies that characterize professional men and women of our day. They are in complete awareness of the excellence of the specialized skills and competence of the individual practitioners, but they are literally appalled at the poverty of these same people in applying the basic elements of successful living; their inability to understand the basic problems of mankind; their lack of a broad perspective for making decisions at the socio-economic level; their almost total ignorance of our western heritage and tradition. This provides the basis for the need of general education. I am somewhat embarrassed to tell you that pharmacy is alone among the health professions in not requiring preprofessional education preparatory to professional study. I am sorry to remind you hospital pharmacists that among most of the professional men and women with whom you work in your hospitals, your general educational background is the least. I say this not in a negative sense at all, but to encourage you individually and collectively to strive for the standards that the American Society of Hospital Pharmacists has repeatedly endorsed. What lies ahead for hospital pharmacy during the next twenty-five years depends in a large measure on the educational background of the practitioners of hospital pharmacy. One factor that in my opinion will be dominant in the continued growth of hospital pharmacy will be education or the lack of it. Education, competence and sound judgment command respect; there is no substitute for them. The men and women who assume positions of leadership in hospital pharmacy in the future must be better educated, they must be better scientists, and they must have broader visions of professional service and social responsibility than those who provide that same leadership today.

IN VIVO EXPERIMENTS WITH CARCINOGENS II, A SURVEY OF THE PERIOD 1949-51

By John R. Sampey *

A PRELIMINARY survey of chemical and biological carcinogenic agents has been made for 1949-50 (133). The author has compiled more comprehensive reviews for inorganic chemicals (134), hormones (135), and fluorenes (136) as carcinogens. The present paper covers some 170 references not included in the above citations of the literature.

Inorganic Chemicals

Arhelger and Kremen (5) have reported cases of epithelioma among patients receiving arsenic medication. Owen (116) has described the development of a carcinoma of the lung in a worker in an asbestos factory. Three other studies have been made currently on carcinoma of the lung in chromate and nickel plants (11, 12, 96). Sissons (153) has produced bone sarcomas in rabbits by the intravenous injection of beryllium compounds. Brues (21) induced bone tumors in mice with injections of radiostrontium.

Several current reports have been made on the induction of thyroid neoplasms following injections with radioiodine. Goldberg, *et al.* (55), noted thyroid lesions in rats after large intraperitoneal injections of the isotope. They also recorded the destruction of the thyroid with large doses of radioiodine (56), and a year later the production of the thyroid neoplasms following a single injection of the isotope intraperitoneally in rats (57). Gorbman (58) induced trachael tumors in mice with massive dosages of radioiodine.

Hydrocarbons

Benzanthracenes. 9,10-dimethyl-1,2-benzanthracene (DMB) has been used extensively as a carcinogen. Whiteley and Ghadially (175) induced skin carcinoma in rabbits by painting with DMB. Engelbreth-Holm and Iversen (44) employed different concentrations of the carcinogen to produce skin papillomas in mice by painting. Cambel (22) has described lung adenomas, and one carcinoma of the peritoneal by painting mice with DMB. Geyer and associates (53)

* Professor of Chemistry, Furman University, Greenville, S. C.

administered the carcinogen intravenously in rats to induce skin tumors, while Rask-Nielsen and Gormsen (123) injected DMB and dibenzanthracene subcutaneously in mice to induce plasma-cell leukemia. Benko, *et al.* (10), induced carcinoma in mice by skin application or intraperitoneal injections of dibenzanthracene. Steiner and Falk (160) have described a summation effect in the formation of sarcomas when 1,2-benzanthracene and chrysen were injected simultaneously in mice. Hackmann (67) produced sarcoma in mice by subcutaneous injections of dibenzanthracene.

Benzopyrene. Hackmann (67) also employed benzopyrene to produce sarcoma in mice, and Rask-Nielsen (123) found this carcinogen also induced plasma-cell leukemia in mice. Glucksmann (54) has described skin cancers from painting mice with benzopyrene. Benko, *et al.* (10), obtained 10% carcinomas from painting or the intraperitoneal administration of benzopyrene in mice.

Dunning, *et al.* (37), induced sarcomas in diabetic and alloxan refractive rats by subcutaneous injections of benzopyrene. Morton, *et al.* (106), has reported that mice exposed to light 12 hours daily showed a higher incidence of skin cancer on painting with benzopyrene than animals kept in the dark. Allsopp (1) has investigated further the effects of ultraviolet irradiation on benzopyrene carcinogenesis.

Methylcholanthrene. Methylcholanthrene (MC) is being used currently more than any other hydrocarbon as a carcinogen. Administered subcutaneously it has induced in mice carcinoma (7, 8, 167), sarcoma (67), plasma-cell leukemia (123) and lung adenoma (164, 165, 166). By skin application it has caused skin cancer (31, 129, 13, 106) and lung adenoma (22). Employed intramurally it has produced adenocarcinoma in the stomach of rats (161, 162), squamous cell carcinoma in mice (46, 47) and skin tumors in mice (69). Implanted in the uterine cervix of mice it induced tumors of the uterus (118), while pellets in the bladder of mice caused bladder cancer (76, 78), and in the stomach wall of mice glandular cancer (71). Intravenously MC has induced pulmonary tumors in mice (31, 147). Shay, *et al.* (142, 143, 144), studied the formation of leukemia following gastric installation of MC in rats; these investigators also produced sarcomas by feeding rats the carcinogen (145). Pullinger (122) induced mammary cancer in mice with MC. Klein (83) noted the formation of cancer of the liver, spleen and testis of mice by subcutaneous and intramuscular administration of MC.

Petroleum. The occupational hazards of workers in the petroleum industry has been the subject of a number of studies (28, 48, 73, 117). Smith (157, 158), Sunderland (169), Suguira (168), Page (117), Pates (120), Blanding (15), and associates have induced skin cancer by painting mice with catalytically cracked oils boiling above 700° F.

Organic Nitrogen Compounds

Dimethylaminoazobenzene. A number of reports have been released on the formation of liver tumors in rats fed p-dimethylaminoazobenzene (DAB) (20, 23, 112, 101, 82, 125, 159, 170, 174). Maisin (97) noted the formation of breast tumors along with hepatomas in rats fed the dye. Miller, *et al,* have carried out investigation on derivatives of DAB: in 1949 they reported (98) on the carcinogenicity of methyl-, chloro-, and nitro-groups; they listed these substituents in the following order: $3' > 2' > 4'$. Later (99, 100) they noted that some mono-and tri-fluoro derivatives were more active carcinogens than the parent molecule.

M'-Methyl-P-Dimethylaminoazobenzene. This carcinogen has been employed extensively in the production of hepatic tumors in rats (26, 89, 124, 178). Rumsfeld, *et al.* (128), reported that this carcinogen and its p-fluoro-derivative were both more carcinogenic to male rats than to female.

Urethane. A number of studies have been conducted on the production of pulmonary tumors in mice through the use of urethane (19, 107, 108, 126, 127, 141). The carcinogen has been administered orally and intraperitoneally.

Thiouracil. Dalton, *et al* (30), studied the metastaces of the thyroid of mice following the long-term injection of thiouracil. Morris, *et al.* (103, 104), reported on the induction, growth and transplantability of thyroid tumors in mice fed the carcinogen.

Aromatic Amines. Ekman and Strombach (41, 42) have produced tumors of the bladder by feeding rats aniline, 2,3-azotoluene, *o*-and *m*-toluidine and *o*-and *m*-aminobenzoic acid. Bonser, *et al.* (16), fed dogs, mice, rats and rabbits 2-naphthylamine and caused carcinomas, hepatomas and adenomas; these workers also induced neoplasms by introducing 2-amino-1-naphthol-hydrochloride into the bladder epithelium of mice. Hackmann (66, 67) induced sarcomas

and hepatomas in mice and rats with 2-naphthylamine and fat soluble dyes. Patellani (119) has recorded the carcinogenic action of aromatic amines given orally and parenterally.

Histamine. Vinals (173) produced stomach tumors in mice by subcutaneous histamine injections.

Pyridoxine. Loefer (95) found that pyridoxine given intraperitoneally increased the takes of tumor fibrosarcoma grafts in rats.

Ethylenimines. Philips and Thiersch (121, 172) noted the mustard like lesions produced in rats, mice and dogs by intraperitoneal injections of substituted ethylenimines.

Nitrogen Mustards. Landing, *et al.* (90), produced lesions in mice like those from X-rays by intraperitoneal injections of nine mustards. Griffin, *et al.* (59, 60), induced fibrosarcoma, lymphosarcoma and adenocarcinoma in mice by intravenous, intraperitoneal and subcutaneous injections in mice of HN2 and HN3.

Acridines. Zajdela and Buu-Hoi (179) induced sarcomas in mice by subcutaneous injections of four acridines.

Nucleic Acids. Skipper, *et al* (155), reversed the antileukemic action of folic acid antagonists with intraperitoneal injections of ribosenucleic and desoxy-ribosenucleic acids.

Hormones

Estrogens. Korenchevsky (85) induced adenoma-like growths in rats by the administration of progesterone orally and subcutaneously. Silberberg and Silberberg (150) induced cancerous lymphomas in mice by subcutaneous injections of alpha-estradiol benzoate. A year later (149) these same investigators stimulated the growth of a mammary tumor in orchidectomized mice grafted with ovaries. Oberling, *et al.* (113), caused mammary cancer in rats by the use of progesterone subcutaneously. Muhlbock (111) employed ovarian hormones to produce mammary cancer in mice. Oberling, *et al.* (113), also caused neoplasms in the hypophysis of rats by subcutaneous injections of testosterone. O'Flynn (115) increased the rate of growth of an adenocarcinoma in mice by injections of extracts of bull testis around the edges of the tumor. Korenchevsky (85) induced adenoma-like growth by oral and subcutaneous administration of progesterone and androsterone.

Hypophysis. Silberberg and Silberberg (149) stimulated the growth of a mammary tumor in mice with grafts of the anterior lobe of the hypophysis.

Cortisone. Howes (74) helped homologous transplantations of tumors in mice and rats with cortisone given parenterally.

ACTH. Flaks (50) induced adrenal cortical carcinoma in overiectomized mice by injections of ACTH. Funk (52) stimulated growth of transplanted tumors in rats by subcutaneous injections of ACTH.

Thymus. Loefer and Gilles (94) significantly increased the number of takes of transplanted sarcomas in rats by giving thymic extracts intravenously or intraperitoneally.

Thyroid. Funk (52) stimulated growth of transplanted tumors in rats with thyrotropic and lactogenic hormones. Korenchevsky (85) produced adenoma like structures in rats by oral and subcutaneous administration of thyroid hormones.

Miscellaneous

Tumor Agent. A number of studies have been carried forward on the infectivity of the mouse mammary tumor agent. Breast carcinomas have developed in the offspring for many generations (2, 3, 4, 6, 9, 14, 32, 51, 68, 77, 111, 146, 151).

Neoplastic Tissues. Cell suspensions of neoplastic tissues have been used to induce cancer in laboratory animals. Gross (61, 62, 63) has inoculated subcutaneously infant mice with cell suspensions prepared from the liver, spleen and lymph glands of leukemic mice and produced leukemia. Sakamoto (130) caused leukemia in fowls by intravenous injections of emulsions from human lmphatic reticulosarcomas. Sanford, *et al.* (137), injected mouse fibroblasts to induce sarcomas. Gye (65) propagated mouse tumors by injecting frozen and dried tissues of sarcomas. Casey, *et al.* (24, 25), produced carcinoma in mice from subcutaneous injections of neoplastic tissues. Kaliss, *et al.* (79, 80, 81), found that both normal and neoplastic tissues injected intraperitoneally in mice enhanced the growth of tumor homiotransplants.

Diet. The influence of dietary fat on growth of neoplastic tissue has been explored critically. Dunning, *et al* (36, 38), increased the rate of formation of diethylstilbestrol induced mammary cancer in

rats with a high fat diet, but they observed no increase in the total number of tumors. Silverstone and Tannenbaum (152) also reported that an increase of fat in the diet of mice from 2 to 20% increased the rate of formation of hepatomas. Boutwell, *et al.* (17, 18), noted the stimulating effect of dietary fat on benzopyrene induced epithelial tumors in mice, but they explained the increase as due to the increase in calories. Tannenbaum and Silverstone (171) noted the increase in spontaneous mammary carcinoma in mice on a high fat diet, and they concluded the increase was not due to increased calories. Korpassy reported many hepatomas on a high fat diet (86, 87, 88).

Skipper, *et al.* (156), have shortened the life span of mice with intraperitoneal injections of folic acid antagonists plus B_{12}. Dunning and associates (39) increased induced mammary cancer in rats by added dietary tryptophane. Wilson (176) has described hepatomas in mice fed a low protein diet and deficient in choline. Schaefer, *et al.* (138, 139), induced gross tumors in weanling rats on a choline deficient diet. Morris and Voegtlin (105) produced greater growth of spontaneous mammary tumors in mice fed methionine. Korpassy (87, 88) reported more tannic acid induced hepatomas in rats fed a low protein diet. Hoch-Ligeti (72) induced liver tumors in rats on a diet of chillies.

Smoking. The relation of smoking cigarettes to carcinoma of the lung has been the topic of a number of investigations (29, 33, 35, 64, 75, 93, 102, 114, 140, 177).

Croton Oil. The co-carcinogenic action of croton oil has been established. Klein (84) reported that the oil induced more sarcomas in mice when injected intramuscularly with methylcholanthrene than when olive oil was used. Salaman and Guynne (131, 132) found that repeated application of croton oil to the skin of mice after apparent recovery from a carcinogen stimulus was similar to repeated application of the carcinogen.

Tannic Acid. Korpassy (86, 87, 88) produced hepatomas in rats by subcutaneous injections of tannic acid.

Carbon Tetrachloride. Hepatomas in mice have been induced through the forced feeding of CCl_4 (70, 92, 163).

Folic Acid. Skipper, *et al* (154), found that folic acid given intraperitoneally accelerated the leukemic process in mice.

4-Amino-N (10) *-Methylpetroglutamic Acid.* Law (91) promoted the growth of cells of tumors in leukemic mice with 4-amino-N (10) -methyl-PGA.

Virus. Duran-Reynals (40) induced sarcomas with brain of chicks injected intracranially with the Rous virus from ducks. Fischer and Syverton (49) reported a virus induced carcinoma in rabbits skin while *in utero.*

Trypan Blue. Cohen and Cohen (27) have reported that Trypan Blue caused transplanted hepatomas to grow in rats when given subcutaneously, while tumors in controls regressed.

Processed Rubber. Benzene extracts of processed rubber painted on the skin of mice or given subcutaneously induced skin cancers (45).

Environment. Muhlbock (109, 110) has reported in his study of environmental factors on mammary tumor incidence in mice that females housed alone in cages had a higher number of tumors than when other mice were present; activity also increased the neoplasms. Engel and Copeland (43) noted increased development of AAF induced tumors in rats fed a high protein diet with the addition of teropterin or a detergent.

Barnacles. Shimkin (148) induced spindle-cell sarcoma in mice by subcutaneous injection of extracts from thatched barnacles.

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SOME IMPORTANT POINTS IN THE HISTORY OF EDUCATION AND LEGISLATION IN A CENTURY OF AMERICAN PHARMACY †

By C. Lee Huyck ††

Early History

ONE hundred years ago Alabama provided laws pertaining to pharmacy by special insertion to the Code of Laws dealing with the practice of medicine. These laws were the precursor to what became later the State Pharmacy Act. Since these laws legally defined the difference between a pharmacist and a merchant, the profession of pharmacy was established from this date as a distinct entity. Legally then, in the United States our profession is 100 years old.

In 1867 the State of Michigan recognized the importance of a college education in the training of a pharmacist by the establishment of the School of Pharmacy at the State University of Michigan. In 1869 the American Pharmaceutical Association (A. Ph. A.) fostered the state pharmaceutical associations by suggesting to the governor and the speaker of each state the appointment of a Board of Pharmacy. Also, a law was suggested to each state to regulate the practice of pharmacy and the sale of poisons and to prevent adulteration of drugs and medicines at the state level. The author of this model law was the German political refugee, John M. Maisch, who became the first permanent secretary of the A. Ph. A.

The First Era 1870-1904

In 1870 the conference of Teaching Colleges was organized. Because of the difference of opinion among experts of the profession at that time as to whether education or experience in a drug store was more important in the training of a pharmacist, no fixed standards for entering the practice of pharmacy were recommended by this group.

Sixty-five years ago in 1887 the A. Ph. A. organized the Section of Legislation at the suggestion of J. P. Remington. In 1889 the two

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sections were united because matters pertaining to legislation and education were found to be closely allied. From this section came two of the most powerful and influential associations in pharmaceutical affairs, namely the American Association of Colleges of Pharmacy (AACP) in 1900 and the National Association of Boards of Pharmacy (NABP) in 1904.

At first this section acted as a clearing house for all matters pertaining to education and legislation by the appointment of committees to study the various problems. The energy of the section however was spent in securing enactment of laws to regulate drug store practices and pharmaceutical education. Today this section provides a place for all of those interested in educational and legislative problems to express their views.

In 1898 the National Association of Retail Druggists (NARD) was organized. This body was formed with the approval of the Section on Commercial interests of the A. Ph. A. headed by J. P. Remington for the protection of business interests of the retailers. The contributions of this group to retail pharmacy have been numerous. Among the recent accomplishments were the passage of the Durham-Humphrey Bill and the McGuire Act.

In 1900 James H. Beal revised and rewrote the model pharmacy law of Maisch. Although many states adopted the original pharmacy law written by Maisch, most states revised their law in keeping with Beal's recommendations. This same year James H. Beal was instrumental in establishing the Conference on Pharmaceutical Faculties which in 1925 became the American Association of Colleges of Pharmacy.

The Second Era 1904-1925

In 1904 Henry B. Mason, Chairman of this Section reported the closing of one educational era and the beginning of another. In that year, Congress provided a Pharmaceutical law for the Indian Territory. This culminated a movement which had lasted for more than thirty years. For the first time in 1904, laws were enacted in every state and territory of the U. S. which provided that persons must successfully pass licensing examinations in order to engage in the drug business.

In 1904 the activity in the fields of legislation was so great that the NABP was born. Also, in 1904 the educational requirements of

pharmacy was recognized by a state for the first time in that New York State called for graduation from a recognized School of Pharmacy as a prerequisite to the licensing examination.

The first year of cooperation between the Boards and Colleges of Pharmacy was in 1904 when the first joint meeting of these groups was held in Kansas City. These joint meetings have proven to be very beneficial to the profession because cooperation between these two important groups is essential.

In 1912 the National Drug Trade Conference composed of manufacturers, wholesalers, retailers and educators was organized. This group proved later to be of great importance to pharmaceutical education. Its Committee on Endowment saw the need for support of pharmaceutical education. It became the American Foundation for Pharmaceutical education in 1941.

It was felt that most states would follow quickly the example of New York in requiring graduation from a recognized school of Pharmacy as prerequisite to the licensing examination, but by 1917, thirteen years later, only eleven states had passed the prerequisite law. Initial educational standards in pharmacy by legislation were difficult to obtain because of lack of initiative, interest and organization among pharmacists.

In 1923 the NABP engaged Dr. W. W. Charters of the Personnel Department of the Carnegie Institute of Technology to make the commonwealth study of pharmaceutical education from the functional standpoint.

The Third Era 1925-1932

In 1925 accredited colleges of Pharmacy required for the first time graduation from high school as a prerequisite to the study of pharmacy. Also, in 1925 college training in Pharmacy was extended to three years.

In 1926 the NABP and the AACP sponsored for the first time district meetings throughout the country. These meetings have been found to be very beneficial in ironing out misunderstandings between boards and colleges of Pharmacy throughout the nation.

In 1927 the Charters Report, "Basic Material for a Pharmaceutical Curriculum" by W. W. Charters and coworkers Lemon, Monell and Fischelis made its appearance. This study gave positive proof that the pharmacist must be an all-round educated man and that the

length of the course in pharmacy should not fall short of four years. On the basis of this report the AACP passed a resolution adopting a minimum four year course of pharmacy in 1932.

The year 1929 was a year of legislative action favorable to pharmacy. First, the Parker Bill coordinating all Public Health activities and promoting Public Health research made possible the appointment of Pharmacists to commissioned rank in the Public Health service. The Capper-Kelly Fair Trade Bill permitted the producer to fix the price at which a product may be sold at retail price and eliminate unfair competition then found in pharmacy. The pharmacy Corps bill giving pharmacists a commissioned rank in the army was passed. This bill was to provide adequate pharmaceutical practice in the military service.

In 1929 the Personnel Classification Board of the Federal Government placed pharmacists in the professional classification rather than the sub-professional class as was originally proposed. The Conference on Pharmaceutical Law Enforcement Officials was organized in 1929.

In 1929, the five year minimum undergraduate course based on the completion of the Junior College was suggested by Dean Wulling of the University of Minnesota. Quoting Dean Wulling:

> "Viewed from the standpoints of practical responsibility and public necessity, pharmacy in its true aspects is not secondary to medicine and certainly not to dentistry, law, education, theology, business, engineering, etc., all of which in their respective best schools are on the minimum five years or higher bases."

In 1930 the joint session of the AACP and the NABP adopted a motion requiring for registration at least twelve months practical experience in a drug store under the supervision of a registered pharmacist.

The Fourth Era 1932-1952

In 1932 the American Council on Pharmaceutical Education was established to set the accreditation standards for pharmaceutical education in the U. S. The council consists of representatives of the American Council on Education, American Association of Colleges of Pharmacy, the American Pharmaceutical Association and the Na-

tional Association of Boards of Pharmacy. In 1939 the conference on Professional Pharmacists was organized which later became the American College of Apothecaries. This was followed in 1941 by the American Society of Hospital Pharmacists. Of great importance to Pharmaceutical education from 1942 were the contributions made by the American Foundation for Pharmaceutical Education in providing properly trained teachers through the awarding of scholarships to graduate students. It should be recalled that the Foundation in the early thirties was the Committee on Endowment of the Drug Trade Conference. The Pharmaceutical Survey inaugurated in 1946 by the American Council on Education under the direction of E. C. Elliott, past president of Purdue University, would have been impossible without the financial support of the Foundation. One of the recommendations of the Pharmaceutical Survey in its General Report of 1950 was to extend the Pharmacy course to five years. This recommendation was voted upon by the AACP in 1951 but did not pass with a two-thirds majority required to amend the constitution which would have been involved.

Present Day Problems in Education and Legislation

1. The Army and Navy should be encouraged to give up the short course training of Pharmacy technicians. To leave pharmaceutical service in the armed forces to the so-called pharmacy technicians with only sixteen weeks of training is a dangerous procedure.

2. Pharmacy should continue the fight to keep Fair Trade. The maintenance of Fair Trade is vital to every retail pharmacist.

3. Pharmacy should see that the Trade Mark laws are revised so that it would be impossible for the same product to be sold under several different trade names. This is one of the underlying causes of brand substitution.

SELECTED ABSTRACTS

The Toxicity of Boric Acid in the Infant. Brooke, C. E., *GP 7:2* (1953). Boric acid is potentially dangerous when used on the skin of infants, particularly when there are macerated or excoriated areas of the skin as in cases of profuse diarrhea. Most of the dusting powders and ointments used for the skin care of the diaper region of infants contain boric acid. Mothers frequently use such powders or ointments with or without the instruction of a physician. Since boric acid is poorly excreted in the urine, lethal or sublethal quantities may accumulate. Symptoms of toxicity do not develop early, and so toxic accumulation may occur in the body of the infant before anyone is aware of the condition.

The clinical diagnosis of boric acid poisoning is made on the basis of an intense erythema of the skin, mucous membranes, and tympanic membranes, by dehydration associated with a profuse bloody diarrhea, and vomiting. Confirmation is usually easily made by asking the mother what treatment had been employed.

Treatment is simply supportive since no antidote for boric acid poisoning is known. The mainstays of treatment are oxygen, blood, intravenous fluids, and antibiotics to prevent the development of bronchopneumonia.

A preferred treatment for severe perianal rash due to frequent loose stools is the gentle washing of the area with boiled water, drying, and then applying a gentle antiseptic protective ointment containing a quaternary ammonium compound.

The author presented two case histories of boric acid poisoning in infants, one of which terminated fatally.

Use of Solution of Sodium Propionate and Chlorophyllin as Wet Dressing. Peck, S. M., Traub, E. F., and Spoor, H. J. *A. M. A. Arch. Dermatol. Syphil. 67:263* (1953). Sodium propionate had proven to be useful in a number of conditions as a wet dressing, for vaginal douches, mouth washes, and foot baths, but the odor was

objectionable. Accordingly the authors combined chlorophyllin with the sodium propionate and not only practically eliminated the odor problem but also obtained an enhancement of therapeutic effect of the fatty acid salt by the chlorophyllin.

The drugs were employed in the form of a powder containing 99.75 per cent sodium propionate and 0.25 per cent sodium copper chlorophyllin. For application, 2.3 Gm. of the powder was added to about 180 cc. of water to form a 1 per cent solution (approx.) of sodium propionate and 0.0025 per cent solution of chlorophyllin. In some instances stronger solutions were used and in foot baths 2.3 Gm. was usually added to a pint of water.

The solution was then used as a wet dressing in such conditions as acute contact dermatitis, seborrheic eczema, dermatophytosis, herpes simplex, and diaper rash, as well as a vaginal douche, mouth wash, and foot bath. The authors noted that it had a marked antipruritic and soothing effect, it was nontoxic, and was somewhat bacteriostatic and fungistatic. Over 100 patients were treated. The authors pointed out that the solution of these two drugs is simply a new type of wet dressing with the advantages mentioned. It is not a generally curative preparation but, as with most wet dressings, is used for the symptomatic relief of certain stages of a dermatitis or to favorably influence the course of an infection.

The Effect of Environment on the Resistance of Bacteria to Antibiotics. Smolens, J., and Vogt, A. B., 53rd General Meet. of the Soc. of Am. Bacteriologists, San Francisco, Calif., August 10-14, 1953. It has been established that the emergence of resistance of bacteria to various antibiotics is due to selection. The resistant members of the bacterial population survive in the presence of the antibiotic, and develop, while the susceptible members perish.

The authors showed that a new mechanism may also act in the development of bacterial resistance to antibiotics. The growth environment plays a part, at least in the *in vitro* experiments studied. *Hemophilus pertussis* and *Micrococcus pyogenes* var. *aureus* were susceptible to streptomycin when grown on Bordet-Gengou medium, except for a small proportion of the total population. However, when grown on modified Cohen-Wheeler medium, 40 per cent of the *H. pertussis* and 100 per cent of the *M. pyogenes* var. *aureus* were

resistant to streptomycin. Control studies showed that the resistance was not due to a neutralization of the antibiotic by some component in the medium.

The resistance characteristics were definitely associated with growth on the particular medium, for a single subculture of the bacteria from one medium to the other brought about an immediate reversal of the resistance of the particular strain of organisms involved. Thus, the authors concluded that the change in resistance was due to a change in the bacteria themselves as a result of growth on these media. They did find, however, that as resistance emerged there was a marked increase in the ribonucleic acid content of the various bacteria employed in these studies.

The Effect of a Progressively Buffered Solution of Ephedrine on Nasal Mucosa. Fabricant, N. D. *J. A. M. A. 151*:21 (1953). A series of rabbits were given a measured instillation of phosphate-buffered ephedrine hydrochloride solution (1 per cent) in the right nostril three times every day for 30 days. The left nostril was untreated as a control. Two rabbits received the solution buffered at a particular pH. The pH increments were 0.5 unit between 2.5 and 12. After 30 days the rabbits were sacrificed and the turbinal structures examined histologically. Gross purulent exudate was found in the tissues of the rabbits which had received the solution buffered at 3.0, 3.5, 4.0, 4.5, 7.0, 11.5, and 12.0. The strongly acid and strongly alkaline solutions produced the tissue reactions expectedly. However, the authors could offer no theoretical explanation for the intense reaction in both rabbits given the solution buffered at pH of 7.0. Varying degrees of inflammation were found in the treated nasal tissues of the rest of the rabbits and in some of the untreated tissues.

The author then discussed the physiology of the human nasal passages in health and disease. He pointed out that the pH of the normal human nasal passage in the adult ranges from about 5.5 to 6.5 and in infants from 5.0 to 6.7. During conditions of acute rhinitis, acute sinusitis, and allergic rhinitis the pH is on the alkaline side. In response to the act of hyperventilation (blowing off of carbon dioxide in vigorous blowing through the nose) the nasal passages become alkaline in reaction. This can at least partially explain the reason for the alkaline nasal state during the conditions mentioned above.

Intranasal treatment of the human nasal cavity should involve not only treatment of the mucous membrance surfaces but also of the nasal secretions. Thus, solutions instilled into the nasal cavity should possess a slightly acid pH corresponding to the normal pH of the passages. By this means an artificial barrier to bacterial infection will be provided and aid the mucous membranes to reestablish normalcy.

Quantitative Studies on a Bacterial Pyrogen. Dare, J. G. *J. Pharm. Pharmacol. 5*:528 (1953). The author reported on an attempt to apply quantitative methods to the older qualitative tests for pyrogens. The pyrogenic material prepared and used for the studies was a dry powdered extract obtained from *Proteus vulgaris*. The organism was grown and emulsified from the surface of solid agar Lab-Lemco medium to a concentration of 9×10^9 organisms per cc. of normal saline. The filtrate from this suspension was treated with acetone containing 0.4 per cent acetic acid. The precipitate thus formed was collected, dried, and sealed in ampuls. This pyrogenic material was found to contain a potent pyrogenic substance. The minimal effective dose was 0.02 μg./Kg. This dry extract remained stable for at least 5 years, the period of study. Aqueous solutions containing 200 μg./cc. appeared to lose some of their activity soon after the solution was prepared but were still highly active after several years storage. The pyrogenic effect was measured by means of two modifications of the fever response test in rabbits.

The author found that the temperature response increased with increasing doses of the pyrogenic material. It was found that the maximum increase in temperature above normal was a more useful measure of pyrogenic effect than was a measure which also took into account the duration of the temperature rise. When the bacterial pyrogen was given repeatedly to the rabbits with intervals of only a few days, the temperature response diminished progressively during the first few successive administrations. This tolerance to pyrogenic material was not permanent, but it required considerably more than 4 weeks before the effect completely disappeared. Variations in the holders for the rabbits and in the method for taking the rectal temperature showed that the maximum temperature response was obtained when the restraint imposed on the animal was minimal and when the temperature was taken by means of thermocouples rather than with rectal thermometers.

The Toxicity of Chlordane Vapors. Ingle, L. *Science 118*:213 (1953). The toxicity of the vapor of the insecticide chlordane (1,2,4,5,6,7,8,8-octachloro-4,7-methano-3a,4,7,7a-tetrahydroindane) to warm blooded animals has been the subject of considerable controversy during the past several years. Experimental results have varied considerably from author to author.

The author placed 20 Swiss albino mice in a wire mesh cage and exposed them for 14 days to a continuous stream of air which had first passed through a solution of chlordane in a saturation train. No deaths occurred nor did any of the mice show signs of anorexia, blindness, or loss of coordination. The animals were sacrificed. At autopsy the organs and tissues were normal.

Since earlier samples of chlordane contained intermediate products of reaction, particularly hexachlorocyclopentadiene, varying quantities of this substance were added to the chlordane sample and the test again performed. In every case except the chlordane control the animals ceased to eat and drink, were lethargic, were apparently blind, and showed loss of coordination. These same symptoms were previously reported in one of the most thorough early toxicity studies of chlordane. Damage to the organs and tissues of the animal bodies was also evident at autopsy.

The author concluded that the variations in the results of earlier toxicity studies on chlordane vapor were due to the presence of unreacted intermediates, such as hexachlorocyclopentadiene, in the commercially available chlordane. Therefore, toxicity should not be attributed to the purified chlordane. The results of this study would indicate that chlordane is not toxic to warm-blooded animals.

A Comparison of the Intravenous and Subcutaneous Routes for the Injection of Different ACTH Preparations. Bates, R. W. *Endocrinol. 52*:266 (1953). A number of reports have appeared which have provided information suggestive that there is more than one factor present in different ACTH preparations. Most of these differences have appeared when comparison has been made between the potency of preparations assayed by the ascorbic acid depletion method following intravenous injection and the increase in adrenal weight method following subcutaneous injection. However, a number of other variables had also entered the picture. The author approached the problem by varying only the route of injection. This

one variable was studied with both an acid exract and an alkaline extract of ACTH. Potency was determined by the ascorbic acid depletion in the adrenal gland of hypophysectomized rats.

It was found that the subcutaneous route of injection required as much as 100 to 1000 times larger dosage than did the intravenous route to cause an equivalent ascorbic acid depletion of the adrenal gland. This information is important clinically because of the fact that ACTH is used mostly by routes of injection other than the intravenous route, which is most commonly used for assay. However, the author admitted that there is no clinical proof as yet that a similar difference occurs in man.

It was also found that the potency of the acid and alkaline extracts varied with the mode of administration. The acid extract was more potent when given subcutaneously while the alkaline extract was superior following intravenous administration. The author concluded that this latter difference was due to the protein and non-protein contaminants and their effect on absorption rather than to the ACTH itself. It was felt that most differences in physiological activity of ACTH preparations are as readily explained on the basis of different rates of absorption as on the basis of more than one factor being present in ACTH preparations.

The Stability of Penicillin Preparations for Injection. Buckwalter, F. H., and Duda, S., *Antibiot. & Chemother. 3*:698 (1953). A series of stability tests were performed on the combination of procaine penicillin G and buffered crystalline penicillin G (sodium or potassium) in dry powder form. This combination is intended for reconstitution at the time of use with a suitable diluent to a usual concentration of 300,000 units and 100,000 units per cc., respectively.

One series of samples were stored in the dry state at 52-56° C. for 12 to 18 months. The samples were reconstituted with distilled water at designated intervals and assayed by the FDA plate assay method. The average loss for 8 production batches after 18 months was 2.3 per cent with a maximum of 7.5 per cent. Another series of 20 samples stored at 22-28° C. showed a maximum loss of 7.2 per cent after two years with an average of 1.1 per cent. Three of these samples were held as long as 4 years. Two of these showed no loss

and one showed a 6.7 per cent loss. A third series of samples from 20 production batches were reconstituted and stored at 5-10° C. for two weeks. The maximum loss was 18.5 per cent in one sample and the minimum was 2.1 per cent.

The samples were also examined for ease of resuspension, fluidity, color, syringeability, and ease of injectability. The samples stored at 56° C. became ivory in color after 12-18 months but were quite satisfactory in all other respects. All of the samples stored at 22-28° C. were satisfactory in all respects.

The authors stated that they considered a 10 per cent loss in potency of penicillin products as insignificant. Therefore, it would appear that this product in the dry form can be stored for several years, even in tropical countries, without any serious loss of penicillin potency.

Antibiotics in Ophthalmology. Sorsby, A., Ungar, J., and Crick, R. P., *Brit. Med. J.* No. 4831:301 (1953). Virus infections of the eye are not readily controlled. It was hoped that chlortetracycline, chloramphenicol and oxytetracycline would be effective in the control of such infections, particularly, dendritic ulcer, disciform keratitis, epidemic keratoconjunctivitis, and herpes ophthalmicus. The authors evaluated these antibiotics in a group of clinical cases.

These antibiotics do not readily penetrate into the eye when administered systemically, and so therapeutic levels are not obtained. They are also limited in their use for subconjunctival injection because of their poor solubility. In the micronized form, suspensions of chlortetracycline and oxytetracycline are markedly irritating. However, a 15 per cent suspension of chloramphenicol is well tolerated and gives adequate intraocular levels upon subconjunctival injection.

In the form of a 1 per cent ointment or as a 10 mg. subconjunctival injection, chlortetracycline did not improve patients with the above conditions. Oxytetracycline as a 0.5 per cent ointment had no effect on dendritic ulcer and disciform keratitis but did give gratifying improvement to 5 cases of epidemic keratoconjunctivitis. Chloramphenicol, in the form of a 1 per cent ointment, 0.5 per cent drops, or 15 per cent suspension by 0.5 cc. subconjunctival injection, did not improve dendritic ulcer, disciform keratitis, herpes ophthalmicus, sympathetic ophthalmia, neuroparalytic keratitis, chronic fol-

licular conjunctivitis, and superficial punctate keratitis. However, gratifying results were obtained in 26 cases of epidemic keratoconjunctivitis treated either with the 1 per cent ointment or the 0.5 per cent drops. Repeated subconjunctival injections of the 15 per cent suspension of chloramphenicol produced good results in a pneumococcus infection which was insensitive to penicillin and the sulfonamides.

The authors concluded that, apart from the control of epidemic keratoconjunctivitis by oxytetracycline and chloramphenicol, the virus diseases of the eye still remain an unsolved therapeutic problem.

The Effect of Carbomycin on Certain Viral and Rickettsial Infections. Wong, S. C., James, C. G., and Finlay, A., *Antibiot. & Chemother. 3*:741 (1953). The antibiotic carbomycin (Magnamycin) was found to possess activity against the rickettsiae *R. prowazekii, F. typhi, R. akari, R. tsutsugamushi, R. rickettsiae, R. conorii,* North Queensland tick typhus, and *C. burnetti* when tested by means of the prolongation of life of an infected chick embryo. The same method showed the antibiotic to possess activity against the viruses of psittacosis, ornithosis, lymphogranuloma venereum, human pneumonitis, feline pneumonitis, and sporadic bovine encephalomyelitis viruses.

In mice infected with psittacosis, rickettsialpox, and scrub typhus a daily dose of 0.25 to 0.5 mg., intraperitoneally, protected the animals. Guinea pigs were protected from epidemic typhus and Rocky Mountain spotted fever by injections of about 10 mg. per Kg. of body weight. The antibiotic was found to be only slightly active against murine typhus infection in mice and ineffective against herpes simplex, mengo encephalomyelitis, rabies, vaccinia, and poliomyelitis. Carbomycin was found to compare favorably with chlortetracycline in the treatment of experimental infections of *R. tsutsugamushi.*

However, it has been found that rickettsiae and viruses can be readily recovered from the tissues of mice and guinea pigs even though they do not exhibit symptoms of infection while under carbomycin therapy. Therefore, the authors concluded that carbomycin shares with oxytetracycline, chlortetracycline, and chloramphenicol the static effect *in vivo* against rickettsiae and viruses.

BOOK REVIEWS

The Phosphatides. By Harold Wittcoff, Research Dept., General Mills, Inc. Pp. xviii + 564 incl. index. Reinhold Publishing Corporation, New York, 1951. Price $10.00.

The Phosphatides is an exhaustive monograph on a limited phase of chemical science, and, as such, poses two important questions for the reviewer. These are, first, what does the book contain which has any bearing on the field of Pharmacy; and second, can a reader having only a casual acquaintance with the subject profit from this work, or does its style make it accessible only to the specialist? To both questions the answer is favorable.

Only half a page suffices for the discussion of the use of phosphatides in drug and cosmetic formulas. But the pharmacist whose interests are more catholic will be interested in many of the subjects which are covered at much greater length. Thus, the available knowledge of the role of lecithin, cephalin, and choline in metabolism forms the basis of modern therapy with lipotropic agents. Phosphatides are important components of the lipoproteins, whose role in atherosclerosis is just beginning to be comprehended. Phosphatides are involved in the thromboplastic factor of blood, though in an unknown manner, and they may act as thromboplastic antagonists in an equally mysterious way. The antigens of the Kahn and Wassermann tests contain significant amounts of phosphatides. Thus, at every point, phosphatide chemistry makes contact with some phase of Pharmacy. There have even been some claims of therapeutic value for lecithin—notably in drug addiction and multiple sclerosis—which may deserve careful re-investigation.

Besides the biochemical aspects already mentioned, the book covers thoroughly the isolation, refining, structure, synthesis, analysis, physical chemistry, and industrial uses of the phosphatides.

In summary, *The Phosphatides* is readable, and has much to interest and stimulate both the chemist and the pharmacist.

S. SCHEINDLIN

Antibiotics. By Robertson Pratt and Jean Dufrenoy. J. B. Lippincott Company, Philadelphia, Pa. Second Edition, 398 pp. Price $7.50.

The Second Edition of this book differs from the previous edition in that its material has been revised and it contains five new chapters. The text is organized into four parts: Fundamental Aspects, Industrial Aspects, Applied Aspects, and Modification of Biologic and Social Systems.

Part I, Fundamental Aspects, contains discussions on the concept of chemotherapy and antibiosis, antibiotic spectra, and biologic significance of fields of diffusion. Part II, Industrial Aspects, is concerned with the methods of industrial production of antibiotics and their screening and assaying.

In Part III, Applied Aspects, there is a detailed discussion on the antibiotics finding medicinal use. Systematically discussed are the source, chemistry, biosynthesis, extraction and purification, stability and use of each antibiotic. The toxicity and forms of administration of the various antibiotics are also mentioned. Contained in this part, too, is a fine discussion on mixed antibiotic therapy, their use in dental practice and oral surgery, in agriculture.

Part IV, Modification of Biologic and Social Systems, has chapters dealing with the energence of resistant strains of micro-organisms and mechanisms of antibiotic action.

There are numerous tables and figures within the contents of this work which make it of special value. For example, there are tables listing the antibiotics biosynthesized by bacteria, actinomycetes, and fungi; their biologic sources; the organisms against which they are active; and their dates of discovery. The antimicrobial substances from chlorophyllus plants and from animals and the schematized structures of selected antibiotics derived from micro-organisms are found in Appendix I and II respectively. There are excellent references listed at the end of each chapter which are most helpful in the study of antibiotics.

This book is highly recommended to those in the many public health professions interested in the field of antibiosis. It is of special use to students and researchers because it excellently represents a fine summarization of the progress that has been made in the study of antibiosis.

MARTIN BARR

American Pharmacy. R. A. Lyman, Editor. J. B. Lippincott Company, Philadelphia, Pa., 1951. Volume I, Third Edition, 505 pp. Price $8.00.

The Third Edition of this text has been changed to accord with the Fourteenth Revision of the *United States Pharmacopeia,* the Ninth Edition of the *National Formulary,* and *New and Nonofficial Remedies,* 1951. Following an introductory chapter by Dr. George Urdang, the text is divided into two parts: Part I, Fundamental Principles and Processes, and Part II, Pharmaceutical Preparations. Part III which appeared in the previous editions and which dealt with Biologicals is not present in this text.

The chapter on Colloids, Suspensions and Emulsions has been changed in content, especially the section dealing with emulsions. The chapter on Sterilization—titled Bacteriologic Technic in the earlier editions—has also been changed somewhat in content.

This text has been authored and edited by twenty seven American pharmaceutical educators. It is an excellent text for the study of pharmaceutical techniques and preparations by the beginning student of pharmacy.

MARTIN BARR

The Laboratory Guide in Chemistry, Second Edition. By Joseph H. Roe, Professor of Biochemistry, The School of Medicine, George Washington University. 216 pages. The C. V. Mosby Company, St. Louis, Mo., 1950. $2.25.

This guide is a manual containing laboratory experiments in chemistry for nurses. The total number of experiments outlined is fifty-two which includes twelve that were not in the first edition. Many of the latter number are in the field of organic chemistry. This large number ot experiments gives teachers a wide choice so that they can select exercises to suit their own needs.

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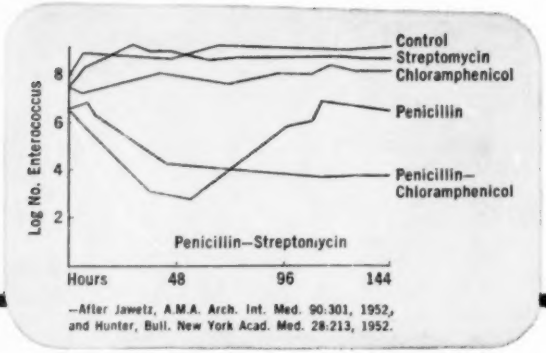

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